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Keeping the lights on

How Australia should navigate the era of coal closures and prepare for what comes next

Tony Wood, Alison Reeve, and Richard Yan

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Overview

Australia's electricity system is changing rapidly as coal-fired power stations close and new renewable ones come online. Australia must successfully navigate through this 'coal closure era' to be well-positioned for a prosperous future.

But there is mounting evidence that the National Electricity Market (the NEM) may not be able to deliver enough investment in low-emissions generation, storage, and transmission, when and where it will be needed.

Ministers have lost faith in the market's capacity to do this, consumers are unhappy with high power prices, and industry players are increasingly wary about investing because they have been buffeted by frequent and unpredictable government interventions in the market.

Governments and industry now face the task of encouraging investment in decentralised, intermittent sources of generation and integrating these into the NEM, in a context of demand that is flat now but likely to rise later, and ageing, unreliable coal generators. Signs are that this is not going well.

Safety margins have been eroded, the market operator is using emergency reserves and backup tools more often, coal plants are suffering more frequent outages, and ministers are responding with greater urgency and concern by directly intervening in the market.

A number of causes have contributed to this situation. Governments and industry have failed to coordinate coal exits and renewables entries, and construction of transmission to support the latter has been slow. A high renewables system with weather-related output also brings different reliability risks. The NEM was not designed for this world.

The way forward lies in recognising that two distinct eras lie ahead for Australia: the coal closure era, and the post-coal era. The challenges in each of these eras are different, and require different approaches.

With careful management, the current mix of federal and state policies, market rule changes, and other interventions will probably get us through the coal closure era without major threats to reliability or emissions targets. At this stage, this mix is technically and politically too difficult to unravel.

Governments must act on two major issues immediately. Deals to manage coal closures must be expedited and coordinated, while momentum on emissions reductions is maintained via the Capacity Investment Scheme and renewable targets. And coordinated, pragmatic action is required to remove road-blocks and bottlenecks to building new transmission.

During the coal closure era, governments should work with industry to plan for the post-coal era. Designing a reformed market for when coal is no longer a material part removes one, large political constraint from the mix.

There are three priorities for planning this future market: a fit-for-purpose reliability framework, an emissions reduction policy for the energy sector beyond renewable electricity targets, and better integration of distributed energy resources. These must be accompanied by a major review of the governance structure.

The key to reforming the electricity system is to accept and work with today's messy but now committed policy frameworks and market mechanisms through the coal closure era, while developing the major reforms that will deliver long-term success for post-coal Australia.

Recommendations

Australia's governments should prioritise ensuring adequate energy resources through the coal closure era and beyond.

The Energy and Climate Change Ministerial Council should work with existing policies and within practical political constraints to navigate through the closure of coal and plan for major market reforms to follow.

During the coal closure era

- Use direct mechanisms with coal generators to provide insurance against early or delayed closure that creates major risks of blackouts and price spikes, or uncertainty for renewables investors. These mechanisms should maintain momentum on emissions reductions and avoid shifting excessive risks from operators to governments and consumers, while being clear and transparent to the market.
- Collectively identify immediate and practical actions to address bottlenecks and barriers to building transmission infrastructure.
- Extend the role of the Integrated System Plan to support the longer-term policy decisions of the Ministerial Council. The plan should represent the lowest-cost mix of generation, transmission, and storage to reliably meet consumers' energy needs and Australia's emissions targets, and it should be tested against potential future risks.
- Monitor key risks – including multiple coal unit failures, accelerating physical climate change impacts, and more rapid deterioration of resource adequacy – and have responses ready.
- Do not damage the parts of the National Electricity Market that work well and are likely to do so in the post-coal era.
- Require formal, periodic review of the NEM by a new, balanced steering group.

Plan for the post-coal era

- Initiate a cross-government review of the role of market participants, market bodies, consumers, and governments.
- Develop the case for and design of a market structure that will help ensure adequate energy resources in a high-renewables system.
- Signal the introduction of a clear and enduring carbon signal for the energy sector to guide investment decisions, including gas plant entries and exits.
- Tackle the challenge of better integrating and orchestrating all forms of distributed energy resources, including but not limited to those that will be considered in the National Consumer Energy Resources Roadmap.

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1 The National Electricity Market has a reliability problem

A good electricity market is reliable, affordable, and sustainable: it delivers clean electricity reliably to consumers, at a price they are willing to pay.

Australia's National Energy Market (the NEM) began in 1998 and covers NSW, Victoria, Queensland, South Australia, and Tasmania. Physically, it includes the generators, poles and wires, and consumers in these interconnected regions. Institutionally, the NEM is also made up of a set of regulations and governance arrangements that oversee its operation, and enable its development.

To date, the NEM has delivered reliable and affordable electricity to consumers. It replaced government-owned and operated systems that had led to substantial oversupply and excessive tariffs. The federal Renewable Energy Target (the RET) has made electricity greener over that time.

Currently, the vast majority of power system outages occur because of problems with poles and wires, not lack of generation. But a reliability problem is emerging. The NEM and the RET combined are no longer able to coordinate the timely entry of adequate resources, particularly flexible and peak capacity, to ensure reliability. The NEM is increasingly operating closer to the edge, and back-up mechanisms are being used more often.

As the Australian economy restructures to meet the challenges of climate change and net zero, it will rely even more on the electricity system. If this system fails, the country is in real trouble.

1.1 A good electricity system is is reliable, affordable, and sustainable

A good electricity system should be affordable for consumers in the long-run, reliably available, and low in greenhouse gas emissions.[1] In Australia, this is codified in the National Electricity Law,[2] which explicitly includes these goals in the National Electricity Objective.

These three goals are often thought of as forming an 'energy trilemma'. Each goal interacts with the other two, and prioritising one may involve trade-offs against the others. Meeting the overall objective means maintaining an acceptable balance between the three goals, even as what is acceptable to consumers may change.

1.2 So far, the NEM has mostly served us well

The NEM was set up to achieve two parts of the energy trilemma: affordability and reliability. In the context of operating the NEM, affordability was considered to mean delivering the lowest-cost combination of assets and operating these efficiently, to deliver the lowest possible electricity price in a given set of circumstances.[3]

The NEM's wholesale spot market is the primary vehicle to deliver these outcomes. It serves two functions:

- It ensures the lowest-cost dispatch of electricity, given demand and available generation capacity.

1. AEMO (2023a).
2. *National Electricity (South Australia) Act 1996*.
3. This is an imperfect definition of affordability, because while the outcome may be the lowest-cost electricity under particular circumstances, consumers' capacity to afford it is a function of their income and other financial commitments.

- It provides price signals for efficient investment in electricity generation over the longer term.[4]

These and other elements of the NEM's design have helped ensure efficient investment in generation for most of its existence, so that enough generation is built to maintain an acceptable standard of reliability. The amount of unserved energy – customer demand that cannot be supplied due to a supply shortfall[5] – has remained low over the past 15 years. The Reliability Standard has only been breached twice – once in Victoria and once in South Australia, both in 2008-09 (see Figure 1.1).[6]

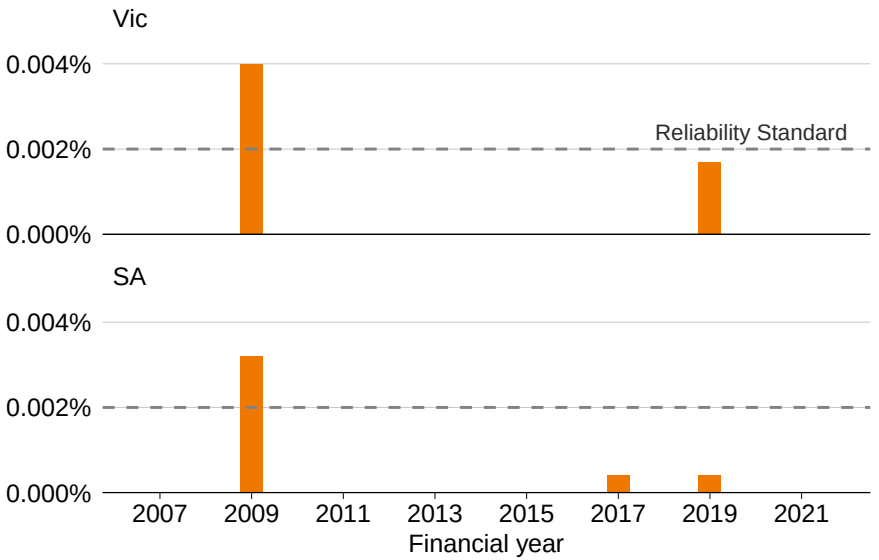
Sustainability has been delivered mostly through renewable energy targets and, for a short time, a carbon price. This has been achieved without severely affecting affordability or reliability. Renewable electricity comprised 8.5 per cent of NEM electricity in 2008, rising to 34.6 per cent in 2022.[7]

1.3 But a reliability problem is emerging

The NEM was designed when the grid was dominated by larger, more centralised generators.[8] But as renewables become cheaper, and with an increasingly binding carbon constraint, governments and market participants must encourage investment in decentralised, intermittent

Figure 1.1: The NEM's Reliability Standard has been breached only twice – once in Victoria and once in South Australia

Unserved energy as a share of all energy demanded



Note: Dataset spans from 2005-06 to 2021-22.

Source: Reliability Panel (2023a).

4. Price signals for investment are provided by the frequency, level, and timing of high price periods in the NEM's wholesale spot market. The expectation of high price periods in the future encourages investors to build new generators that are able to provide capacity during those periods. And once they do, the price signal to invest disappears, because the new generator has an incentive to bid into the spot market at their short-run marginal cost of generation and so becomes the marginal generator.
5. Due to a lack of available generation, a lack of demand response, or a lack of capacity in the transmission network: AEMC (2019).
6. See Box 2 on page 19 for an explanation of the Reliability Standard.
7. Saddler (2023).
8. Finkel et al (2017, pp. 29–30).

sources of generation. The integration task is becoming more complex. Demand that has been flat for a decade is projected to grow steadily with the electrification of transport and some gas load, and ageing thermal generators are becoming less reliable.[9]

These changes are necessary to decarbonise electricity, but they are testing the NEM's adaptability. It is becoming clear that the NEM, as it is currently set up and without a clear embedded carbon signal, may no longer be able to maintain an adequate stock of generation and network resources to maintain sufficient reliability (i.e. resource adequacy, see Box 1 on the following page).

If this trend continues, the use of back-up mechanisms could increase – at substantial cost to the consumer – and blackouts could become more frequent.

This is making policy makers, ministers, and industry participants increasingly nervous.

1.3.1 The NEM is operating closer to the edge more often

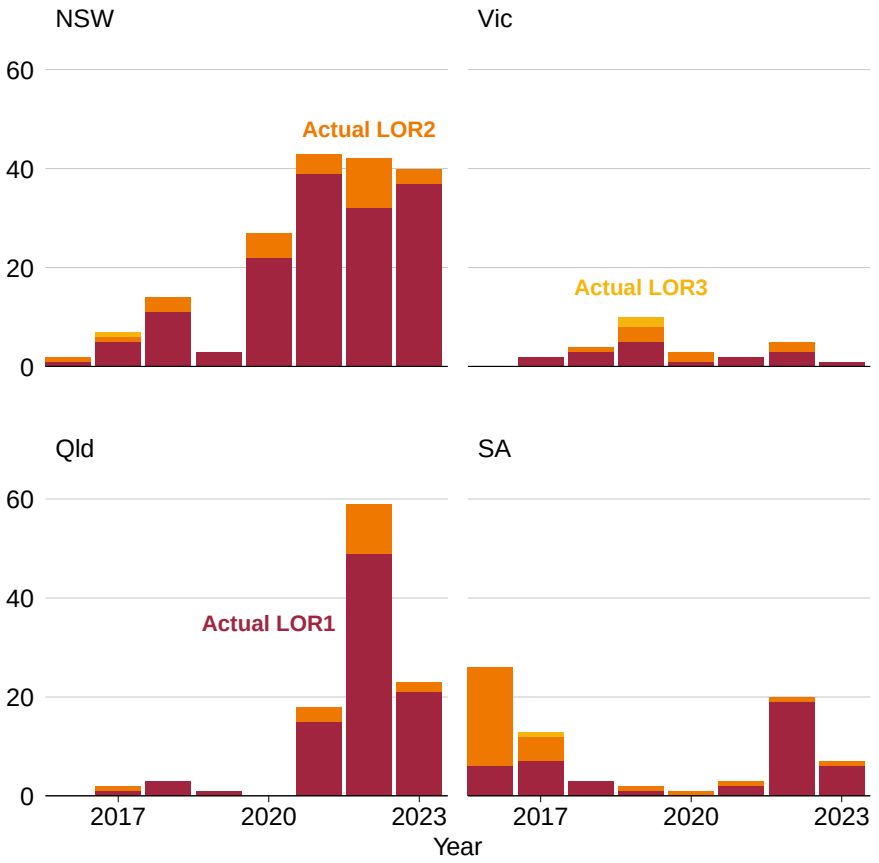
A reliable power system should have a buffer of available supply or demand response – together known as 'reserves' – in addition to the expected amount of capacity required, which can be used if there is an unexpected change in demand or supply.[10]

Most of the time the NEM is in such a reliable state – the cheapest sources of power are dispatched into the grid to meet demand, and a buffer of more expensive energy remains available if needed.

But when demand surges (such as during hot days) or there is less energy available due to generator outages or weather, there may not be enough of a reserve to deal with unexpected events.

Figure 1.2: Instances of low electricity reserves are increasing in most states

Number of actual lack of reserve (actual LOR) notices issued



Notes: Actual LOR1 means reserve levels 'are lower than the two largest supply resources in a state'. Actual LOR2 means reserve levels 'are lower than the single largest supply resource in a state'. Actual LOR3 means 'the available electricity supply is equal to or less than the operational demand' (i.e. there are no reserves). An actual LOR3 usually means that load shedding is happening. Actual LOR notices in SA in 2016 and 2017 were largely due to planned transmission outages. Tasmania is excluded because there were few actual LOR notices issued there over this period.

Source: Grattan analysis of AEMO (2024a).

9. AEMO (2023b).
10. Reliability Panel (2023b, p. 3).

Box 1: What is resource adequacy?

When consumers lose power, it is normally for one of three reasons:[a]

1. **Network outages**: unplanned outages on the distribution and transmission networks, such as those due to severe weather. This is the most significant cause of power outages (see Figure 1.5 on page 12).
2. **Power system security problems**:[b] involving the inability of the system to operate within the technical limits of the system, such as voltage, or frequency standards. This can occur as a result of unexpected losses of transmission or generators. To manage these situations, generators or networks may be 'tripped' (automatically disconnected).
3. **Resource adequacy problems**: when energy is not available to consumers because demand exceeds available supply. When this happens, the Australian Energy Market Operator (AEMO) typically requires 'load shedding', which is a manual shutdown of power to parts of the electricity network (usually on a rotational basis) to bring supply and demand back in balance and prevent larger-scale blackouts.[c]

'Resource adequacy' refers to having adequate 'energy resources' or 'capacity' in the grid. These energy resources consist of:

- Generation capacity – electricity generation capacity to meet demand at any given time, including a buffer or reserve margin.
- Demand response capacity – the flipside of generation capacity is the ability and willingness of electricity consumers to reduce their use of electricity, and thereby reduce overall demand on the system, at any given time.
- Network capacity – the availability of electricity in the right spots to meet demand at any given time.

Resource adequacy can also usefully be understood to mean having enough capacity, of the right type, at the right time:

- Enough: there needs to be enough capacity in the system to deal with average levels of demand.
- Right type: not all capacity is the same – the grid needs to be composed of the right type of capacity to deal with fluctuations in demand (over the course of a day or between seasons) and, in the case of intermittent renewables, weather patterns. This may also involve ensuring capacity is in the right geographical locations.
- Right time: entry of capacity needs to be in lock-step with exits of capacity, for example, the closure of large coal generators.

a. Reliability Panel (2023b).
b. AEMO (2023a).
c. It is sometimes difficult to attribute events that lead to lost load to particular causes. Officially, it is AEMO's role to determine whether an event is defined as a security or resource adequacy event: Reliability Panel (2020, p. 62).

AEMO, the market operator, helps manage periods of lower energy reserves by issuing forecast 'lack of reserve' (LOR) notices at three levels of seriousness. These notices signal to the market that more capacity is needed, and encourage generators and large consumers to make more energy available. An 'actual LOR' notice is issued if a period of low reserves actually occurs, again with three levels of seriousness. An 'actual LOR' will follow a 'forecast LOR' if the market response to the forecast is insufficient, and forecast conditions eventuate.

Since 2017, the number of actual LOR notices issued by the market operator has increased in most NEM regions (Figure 1.2). This suggests an increase in the number of periods of very tight supply, with fewer reserves available.[11]

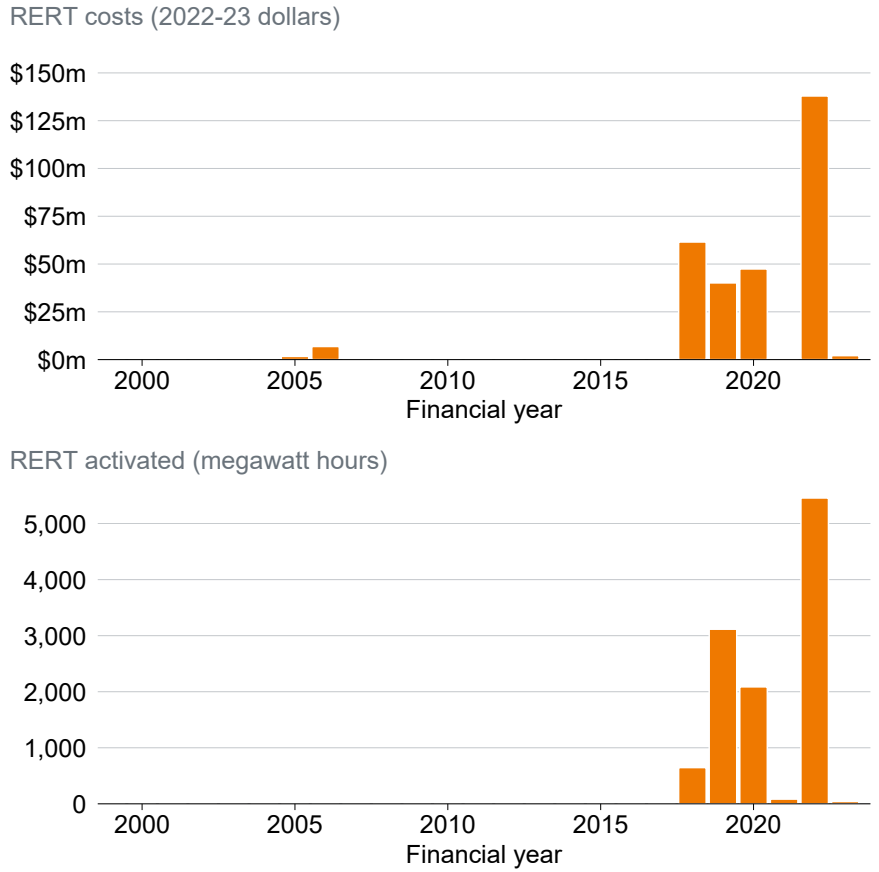
1.3.2 Back-up mechanisms are being used more often

In cases where there is a lack of reserve in the NEM and generators cannot make more power available, the market operator can rely on demand response and back-up, off-market reserves to avoid the need for load-shedding. The Reliability and Emergency Reserve Trader (the RERT) is the main tool for this job.[12]

Between the NEM's inception in 1998 and 2016, back-up supply was only procured on three occasions (in 2004-05 and 2005-06, as Figure 1.3 shows), and was never used.

But since 2017, there has been a striking change. Back-up resources through the RERT have been procured, and called upon, in every

Figure 1.3: The Reliability and Emergency Reserve Trader (RERT) mechanism has been used much more often in recent years



Notes: Dataset spans from 1999-2000 to 2022-23. Data not available for amount of RERT activated before 2017-18, though a lack of RERT costs implies no RERT activation.

Sources: Reliability Panel (2014), Reliability Panel (2016), Reliability Panel (2018), Reliability Panel (2023a), AEMO (2012a), AEMO (2014a), AEMO (2023c), and ABS (2024).

11. Reliability Panel (2023a, p. 34).
12. AEMO's Wholesale Demand Response mechanism can also be used to help reduce demand, but there have been few Demand Response Service Providers registered to date: AEMO (2024b).

financial year since 2017-18. In 2021-22, this came at a cost of more than $125 million to energy consumers.[13]

That AEMO is being forced to activate the RERT more often is a sign that the industry is not providing enough capacity of its own accord to the wholesale spot market.

1.4 Resource inadequacy is unlikely to resolve itself in the future

The trends toward more frequent low reserve margins and more frequent use of back-up mechanisms are likely to get worse.

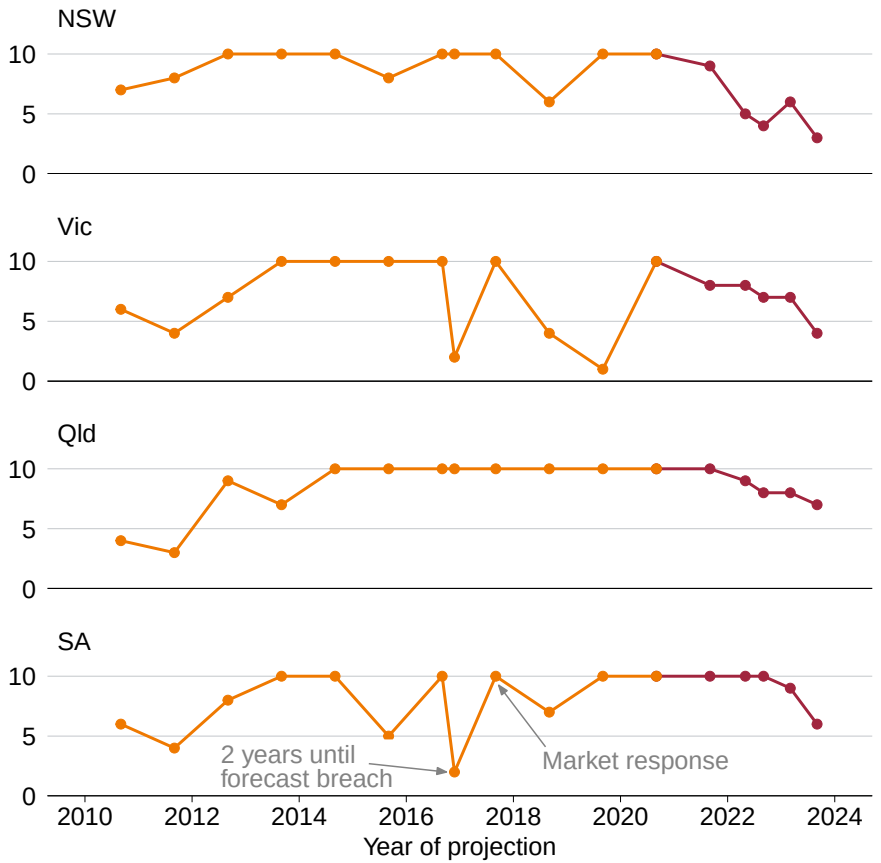
Each year, AEMO prepares an 'Electricity Statement of Opportunities' (ESOO), which identifies potential capacity shortfalls over a 10-year period.[14] The purpose is to signal to industry the need for new investment or other actions.[15]

Potential capacity shortfalls in the ESOO can vary considerably year to year – one ESOO can show a shortfall is 10 years away and the next can show it is only two years away, or vice versa. This happens when a large amount of capacity is removed from the system, when demand and weather forecasts change substantially, or when the market responds with new investment.

The ESOO has historically helped to elicit a swift market response, with new investment pushing out the timeframe for a forecast shortfall

13. RERT costs are recouped from customers in the affected region. Generally, this is by imposing a recovery rate per MWh on customers using electricity during the RERT event and in the billing week containing the RERT event: AEMO (2021a).
14. AEMO (2023b).
15. The ESOO assesses the likelihood of a future shortfall, given weather patterns, currently planned plant retirements, and the connection of 'committed' and 'anticipated' generation projects which are expected to come online in the near term. By signalling a need, or an investment 'opportunity', for new generation, the ESOO is designed to encourage industry to build more generation to avoid shortages.

Figure 1.4: The market has not been responding sufficiently to reliability issues that have been forecast since 2021
Years until first forecast breach of Reliability Standard, by year of projection



Notes: Tasmania is not included because it does not have a forecast breach of the Reliability Standard in any Electricity Statement of Opportunities (ESOO) over this period. ESOOs are usually published yearly, but in 2016, 2022, and 2023, updates were issued after significant new information came to light.

Sources: AEMO (2010), AEMO (2011), AEMO (2012b), AEMO (2013), AEMO (2014b), AEMO (2015), AEMO (2016a), AEMO (2016b), AEMO (2017), AEMO (2018), AEMO (2019), AEMO (2020a), AEMO (2021b), AEMO (2022a), AEMO (2022b), AEMO (2023d), and AEMO (2023b).

soon after a shortfall is forecast. But the past five ESOOs are more pessimistic, with forecast shortfalls creeping ever closer (see Figure 1.4 on the previous page).

There has been an insufficient investment response from the market, despite reliability concerns having been signalled since 2021. This seems unlikely to change without corrective action.

1.5 Why governments should focus on resource adequacy

Of the three main causes of blackouts (discussed in Box 1 on page 9), resource inadequacy has been the smallest issue to date (see Figure 1.5).

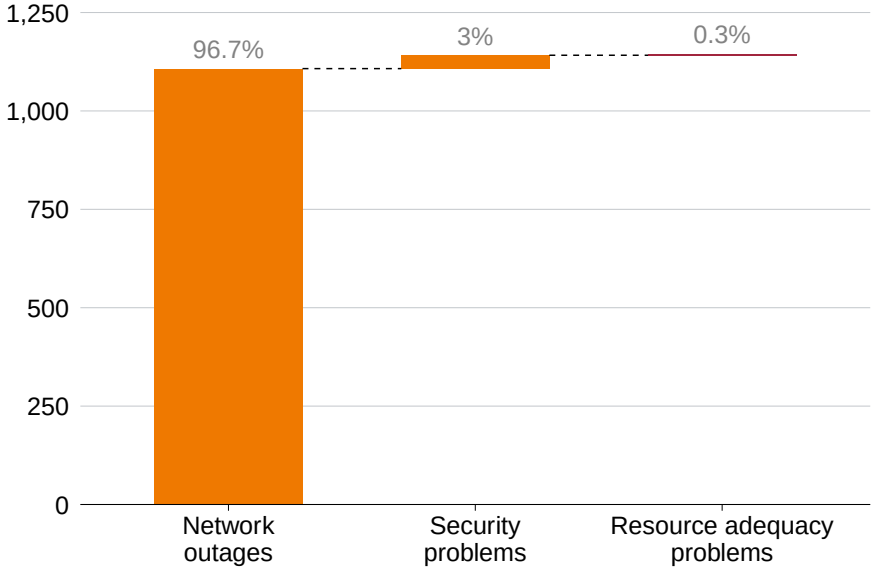
However, all signs point to a looming resource adequacy problem in the future. And when resource adequacy events occur, the consequences are much wider, more disruptive, and more costly. Resource adequacy events tend to be sudden and unplanned, even if they occur infrequently. By contrast, network outages are often planned and communicated (for example, because maintenance or tree-trimming are required), and consumers understand them and can prepare for them.

Maintaining resource adequacy is also a political imperative. If reliability declines during a period of coal closures and greater renewable generation, it is likely that popular support for the transition to a low-emissions economy will wane, putting at risk political will to continue the process.

1.5.1 This report does not focus on network outages and power system security issues

Network outages are a solvable problem, and there is a potential solution in the works for system security concerns.

Figure 1.5: Power outages are overwhelmingly due to network outages
Minutes of outage between 2009 and 2019, by cause



Note: Network outages includes distribution and transmission network outages.
Source: Simshauser and Gilmore (2022).

Network outages, especially on the distribution network, have caused the vast majority of power outages (Figure 1.5 on the preceding page). The engineering solutions to improve network reliability are well-understood, but their costs vary. In accepting the current prevalence of network outages, the electricity market bodies have made a trade-off between network reliability and the cost to consumers. They should be clear-eyed when doing so, as we suggested in our 2019 report *Keep calm and carry on*.[16]

The NEM's wholesale spot market was not designed to explicitly value essential system services to keep the power system in a secure operating state. This worked for a system dominated by thermal generators, because those technologies provide system services for free alongside bulk electricity. With more renewables in the system, AEMO now needs to regularly direct generators to provide these services. The increase in these directions shows no signs of slowing down, especially in South Australia.[17] To address this, the Australian Energy Market Commission has recently published a set of reforms to improve system security procurement frameworks, though it is to be seen whether these reforms solve the problem.[18]

1.5.2 Sustainability and affordability are important goals to keep in sight

Alongside resource adequacy, sustainability and affordability remain important to keep in sight as goals to achieve during the energy transition. But some trade-offs may be inevitable, until momentum for investment in renewables, transmission, and storage gets ahead of coal closures.

In the short term, if the market is not able to coordinate the entry of renewables and the exit of coal, a trade-off between emissions and reliability may be necessary. For example, the Victorian government's risk-sharing contracts with AGL and Energy Australia may keep coal generators open longer than they otherwise would, to maintain reliability at the expense of cutting emissions.[19]

And the affordability goal constrains what can be done to achieve resource adequacy. Maintaining social licence for the energy transition depends on maintaining electricity affordability.[20]

1.6 The structure of this report

This chapter has shown that resource adequacy is at risk in the NEM.

Chapter 2 considers the potential causes of resource inadequacy in the NEM.

Chapter 3 lists and assesses the actions that governments and market bodies are taking to deal with these causes.

Chapter 4 makes recommendations on how governments should manage the transition to the post-coal era.

16. Wood et al (2019a).
17. Grattan analysis of AEMO (2024c).
18. AEMC (2024a).
19. Macdonald-Smith (2021) and Gordon and Johanson (2023).
20. CSIRO (2024).

2 What's causing the reliability problem

Our consultations with a range of stakeholders have identified four causes of the emerging reliability – or 'resource adequacy' – problem.

First, there is a lack of coordination between coal generators being closed, replacement renewable capacity being built, and transmission lines being constructed. This is exacerbated by community opposition to transmission lines, and by labour and material shortages.

Second, government policies focus on achieving a percentage of electricity production from renewable sources. This distracts policy effort from the real objective: delivering a reliable system that meets emissions targets at the lowest overall cost for consumers.

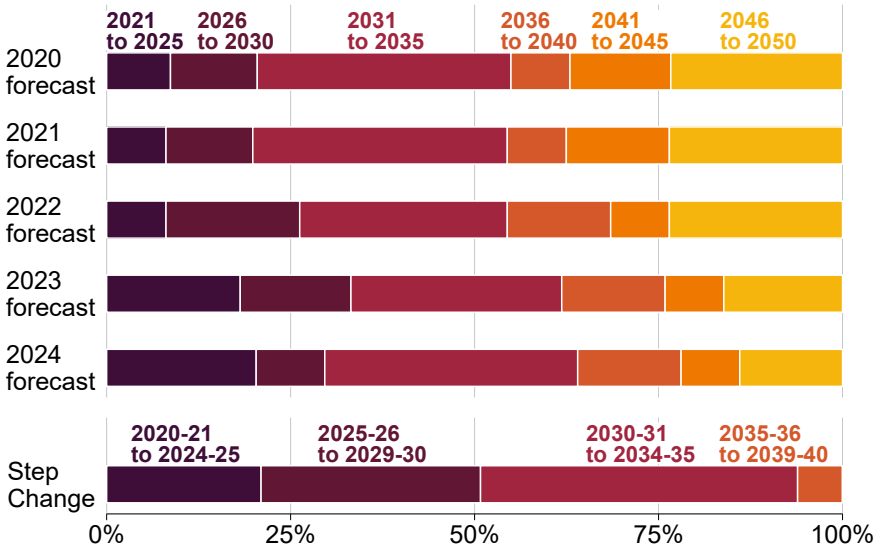
Third, the way the risks to reliability are articulated no longer reflects the physical realities of the changing electricity system. Instead of outage risks being demand-driven, the risks now correlate strongly with weather patterns.

Fourth, market institutions and rules were designed for steady-state operation. Changing the rules does not bring about change fast enough, so ministers increasingly prefer not to rely on the rules and instead make their own interventions.

The above are not merely physical or institutional problems. They all have a political aspect as well. Governments are highly sensitive to reliability issues – unsurprisingly, given it is ministers who have to front the media during or after blackouts. This heightened sensitivity has led them to favour more interventions, and to choose interventions that create the immediate appearance of 'doing something about reliability' rather than addressing underlying causes. Some of these interventions have pushed the market towards higher-cost solutions, and spooked investors.

Figure 2.1: The schedule of planned coal closures is being brought forward every year

Share of 2020 coal generation capacity expected to exit, by five-year period



Notes: Step Change is the most likely scenario from the Australian Energy Market Operator's (AEMO) Draft 2024 Integrated System Plan. It represents AEMO's assessment of the most likely schedule for coal closures, including closures that are sooner than announced. In the Step Change scenario above, Eraring is assumed to close in 2024-25 rather than the announced date of August 2025 for ease of comparing financial and calendar years. 'Forecasts' use announced closure date where available, and expected closure year provided to AEMO otherwise. For Queensland, the forecasts in this figure only includes expected coal closure timings provided to AEMO, not those implied by the Queensland Energy and Jobs Plan. Forecasts use the first available update of Generation Information from each year. Forecasts assume that Callide C and Millmerran close in 2050. After the 2023 forecast, the expected closure date for Vales Point B was pushed back from 2029 to 2033.

Sources: Grattan analysis of AEMO (2023a), AEMO (2020b), AEMO (2021c), AEMO (2022c), AEMO (2023e), and AEMO (2024d).

2.1 There is a lack of coordination

Ensuring the lights stay on requires getting timely entry of enough new capacity of the right type.

Ideally, new assets (renewables, gas, and storage) need to be in place before old ones (coal) exit, so there is no gap in supply. But the current NEM design does not encourage entry before exit. And these new assets need to be able to efficiently connect to the grid in order to dispatch their energy.

An added benefit of coordination is that it prevents an extended period of high wholesale prices, such as we saw in the late 2010s. The current market design makes such coordination difficult.

2.1.1 Coal exit timing is uncertain

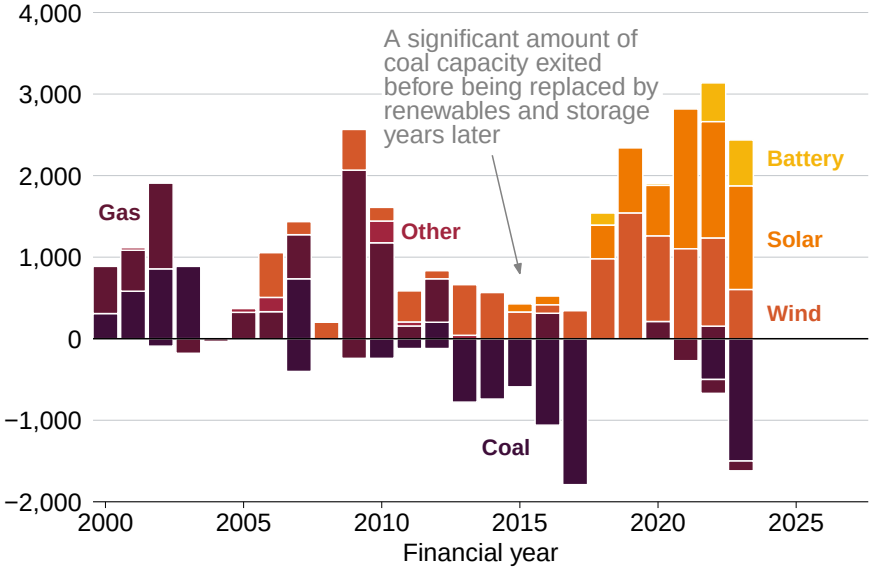
Australia's coal fleet is ageing, and will need to be progressively retired.

Historically, the electricity market operated similarly to any other capital-intensive market. New capacity investment would meet growing demand or follow the retirement of ageing incumbent capacity. The NEM wholesale spot price provided a signal for such investments.

But in recent times, renewable electricity policies have encouraged new entry, much of it unpredictable. An intended result has been to reduce the profitability of incumbent capacity. But it has also created unmanageable uncertainty for both new entrants and incumbents. For instance, the schedule of planned coal plant closures is being revised forward every year (see Figure 2.1), as these plants become less profitable to run and maintain.

An example of this problem was the closure of the Hazelwood power station in Victoria in 2017 with only five months notice, citing difficult market conditions.[21] This is not enough time for developers to respond,

Figure 2.2: Generation exit and entry fell out of step in the mid-2010s
Megawatts of generation capacity connected to or disconnected from the NEM



Note: Before 2014, the 'Other' category included solar, battery, biomass, and other non-coal, gas, and wind projects.

Sources: AER (2017) and AER (2023).

21. Engie (2016).

and creates higher risk for investors in new assets, which is why a lumpy renewable investment 'supercycle' only followed a couple of years *after* a string of coal exits in the mid-2010s (see Figure 2.2 on the previous page).[22] A further consequence was higher wholesale prices in the intervening period, until the replacement renewables came online.

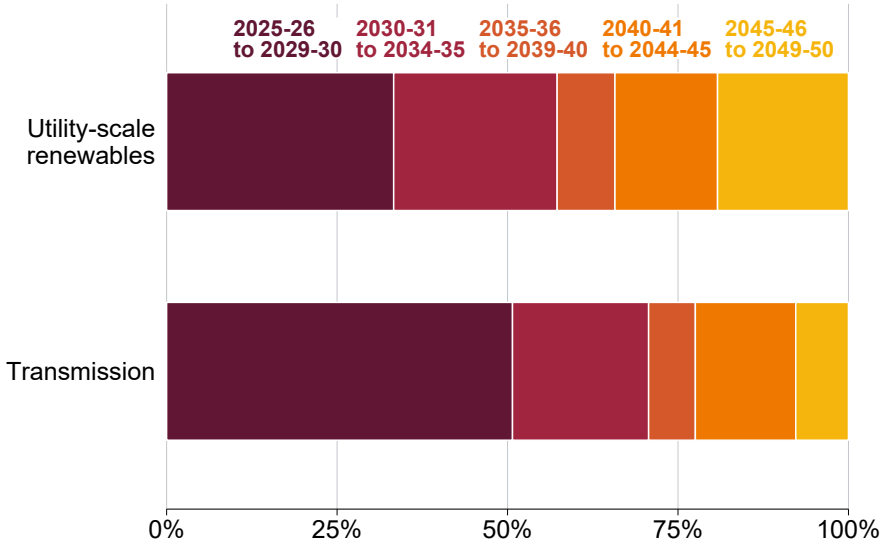
2.1.2 Community opposition, supply chains, and costs affect whether replacement capacity can be built in time

To replace coal and meet increasing demand from electrification, AEMO's Integrated System Plan forecasts about 125 gigawatts of utility-scale renewable generation will need to be built under the central 'Step Change' scenario by 2050.[23] In comparison, about 18 gigawatts had been built by 2022-23.[24] To support this new, distributed generation, about 8,000 kilometres of new transmission and upgrades are required by 2050, as are an additional 3,000km of more local transmission to connect generation within Renewable Energy Zones (REZs) to REZ networks.[25]

However, these generation and transmission developments are encountering community opposition, high costs, and equipment shortages.[26]

Communities that haven't previously hosted energy infrastructure are being confronted with a wave of development interest. They are concerned about disruption and loss of amenity during both

Figure 2.3: Most of the construction task to 2050 for utility-scale renewables and transmission occurs in the next decade
Share of final 2049-50 build projected to be completed, by five-year period



Notes: Integrated System Plan, Step Change scenario. 2024-25 is used as the base year. Utility-scale renewables includes offshore and onshore wind, and utility-scale solar.

Source: Grattan analysis of AEMO (2023a).

22. Simshauser and Gilmore (2022).
23. AEMO (2023a).
24. Ibid.
25. AEMO (ibid, p. 51) and AEMO (2023f, p. 9).
26. This report does not consider supply chain issues and high costs, because its focus is on energy policy. Also, these issues do not only affect the energy sector.

the development and operation phases, and about the lack of early engagement and transparency from project proponents.[27]

In addition, labour, capital, and the equipment required for the energy transition are in short supply, and this is affecting the timely build of transmission and renewable generation.

These concerns will be most acute in the next decade or so (see Figure 2.3). In particular, a significant amount of transmission needs to be built now (about 5,000km of new and upgraded transmission in the next decade) to unlock Renewable Energy Zones before renewables can be built there to supply the grid. Resource adequacy will suffer if this building doesn't occur on schedule.

2.1.3 Building transmission for renewable energy is not well coordinated

The rules governing generators' access to transmission, both to connect to transmission and then to dispatch electricity to consumers via transmission, have not been playing the role needed to maintain resource adequacy.

For most of the past two decades, operators of solar and wind farms have been able to find locations where the transmission grid had capacity to transport their output. That began to change as the availability of suitable locations dried up. Renewable generators found that even when they were granted regulatory approvals for construction, their output could be curtailed.[28] The financial impact was destructive.[29]

There have been several attempts over the past five years or so to introduce ways to manage the coordination of transmission and generation, but they failed to get necessary support from industry and governments.[30]

Without an updated transmission access regime, the future returns available in the market to renewables investors are uncertain, which could lead to under-investment.

2.2 The policies used to encourage renewables are creating problems

Moving from a grid based on thermal generation to one with high levels of renewable generation was always going to be a challenging task.[31]

Governments and market bodies have implemented various policies to encourage investment in both utility-scale and behind-the-meter renewables, to great effect. But these policies and rules are narrow instruments in their support for more renewables, and are making it harder for the NEM to attract the most efficient investments that would help ensure resource adequacy at lowest cost.

2.2.1 Renewables targets are narrow instruments

The federal and most state governments have set targets for the percentage of electricity demand to be met from renewable sources. These targets are supported by subsidies or government contracts paid for by consumers or governments.

Renewables targets have the advantage of being easy to communicate, and they have proven to be popular with voters. The most prominent

27. Dyer (2023).
28. Curtailment refers to AEMO not allowing a generator to dispatch electricity (and hence earn the wholesale price) into the network, because of congestion on the transmission system.
29. Sarcevic (2019).
30. AEMC (2020).
31. In particular, a largely thermal system has more 'grid-forming' technology, that is able to respond flexibly to changes in voltage and frequency to keep the system balanced. Renewable generators are more likely to use 'grid-following' technology, which match changes to grid voltage and frequency rather than countering them, and therefore don't help balance the system. There have been some shifts towards grid-forming renewable technology, but these are not yet prevalent.

example of a successful policy is the federal government's Renewable Energy Target (RET), which has driven significant investment in renewables.

But the design of renewables targets makes it more difficult for the NEM to deliver resource adequacy at lowest cost:

- Measuring and rewarding progress in the form of the 'renewable electricity share' does not allow for the role of gas as a transitional, dispatchable technology. By only giving renewables a source of revenue outside the wholesale market, the Large-scale RET (LRET) makes gas as uncompetitive as coal, despite it being lower emitting.[32] This is a problem because gas could play a crucial role in providing the last 10 per cent of generation to unlock greater use of renewables.[33]
- Under the LRET, every megawatt hour generated creates what is called a Large-scale Generation Certificate, or LGC. Ideally however, the policy should be targeting emissions abated, which is different at different times of day, depending on what generation source a renewable generator is displacing. Storage that can displace carbon-intensive generation is also not encouraged by the LRET, because it is excluded from receiving LGCs. Investment decisions are skewed towards extra renewable generation, which may hamper the achievement of low-cost resource adequacy.
- Renewables targets are also not being coordinated between states to deliver the least-cost, fastest-to-build system. Independently set, state-based targets are primarily aimed at regional economic development, creating an arms race for labour, equipment, and materials. As a result, they do not deliver the cheapest and fastest system-wide decarbonisation while maintaining resource adequacy.

2.2.2 The integration of distributed energy resources into the grid has created unintended consequences

Distributed energy resources (DER) generally include electricity storage and generation units located on the customer's side of the meter connecting them to the local grid. Australian households have rapidly adopted rooftop solar to save money, contribute to addressing climate change, and be less dependent on the central system.[34] This adoption was strongly supported by subsidies, the cost of which has been largely covered by spreading it across a local customer base. Rooftop solar owners are also rewarded with tariff payments for selling excess electricity back to the grid.

Unlike the response to large-scale renewable generators, rapid growth in rooftop solar has not been accompanied by planned or effective integration. Households with rooftop solar are paid a flat rate for the power they export, regardless of the time of day or the time of year – so they are insulated from market price signals.

The result is that rooftop solar does not contribute effectively to lowest-cost resource adequacy. For instance, networks are built to have the capacity to meet peak demand that is often quite volatile over daily and seasonal cycles. Demand on electricity networks comes within 5 per cent of the annual peak for an average of between six and 21 hours a year – less than 0.24 per cent of the time.[35] Rooftop solar, however,

32. The LRET sits under the RET as the certificate scheme targeting utility-scale renewables. The RET also includes the Small-scale Renewable Energy Scheme (SRES), which provides incentives to households for investment in small-scale renewable energy.
33. Wood and Ha (2021).
34. The issue of integrating and orchestrating DER is broader than just rooftop solar but not explored further in this report. An in-depth consideration of DER will be the subject of a future Grattan report.
35. Wood and Carter (2014).

produces little electricity during peak demand periods, which usually occur in the evening.

However, electricity over-supply during the day also presents opportunities for reducing peak demand and hence network costs with the right incentives and consumer buy-in. For example, sharper price signals for rooftop solar owners in the form of cost reflective feed-in tariffs could better encourage the take-up of household batteries to supply electricity during the evening peak. This could reduce the amount of network infrastructure needed, and reduce network costs for all consumers.[36]

2.3 The nature of resource adequacy risks is changing

The nature of resource adequacy risks in the NEM is changing with the greater use of intermittent renewable generation.[37] This is because a larger share of generation capacity is more weather-driven. While outages at fossil fuel power plants are independent of each other, this is not always the case with renewable generators. For example, the inability of a particular solar farm to generate electricity due to cloudy skies, for example, will often coincide with the inability of other solar farms to generate as well. The same applies to wind farms on still days.

In a system dominated by thermal generators, resource adequacy risks are mostly during summer, and concentrated in the evening peak. If a renewables-dominated electricity system has insufficient energy storage or dispatchable capacity then the sorts of resource adequacy events that arise will:

- Be driven increasingly by the weather.

36. Esplin and Nelson (2022).
37. This is not to say resource adequacy issues *will* arise in the NEM with increased renewables. It is simply saying that, where they arise, the nature of risks will change, requiring the policy infrastructure around the NEM to respond.

Box 2: How the NEM manages resource adequacy risk

Since the NEM began operating in 1998, resource adequacy risks have been managed by a Reliability Standard. It sets an average level of unserved energy over the year that must be met, aiming for the NEM to have enough resources to ensure that *on average* 99.998 per cent of electricity demanded by customers is delivered, not accounting for network outages or power system security issues.[a] This is equivalent to power outages totalling 10 minutes and 30 seconds in a year if spread across all consumers.

The Reliability Standard is the modelled 'optimal' level of resource adequacy that best balances the goals of reliability and affordability, based on values of customer reliability as determined by surveys run by the Australian Energy Regulator.[b]

The market operator manages day-to-day risks to resource adequacy to ensure the Reliability Standard is met. In the first instance, AEMO regularly provides information to the market on likely near-term resource adequacy risks relative to the Reliability Standard, including notices of forecast lack of reserve, to elicit a market response. If this seems likely to fail, the market operator can contract for additional reserves via the Reliability and Emergency Reserve Trader (RERT) function. The RERT acts as a safety net in the event that the NEM cannot deliver sufficient reserves to ensure that the Reliability Standard is met.

The Reliability Standard is also used to inform the annual Electricity Statement of Opportunities (ESOO – see Section 1.4). The ESOO forecasts resource adequacy risks against the Reliability Standard to highlight investment opportunities to the market.

a. AEMO (2023g, p. 5).
b. Reliability Panel (2022, pp. 8, 51–52).

- Tend to be longer and deeper (i.e. affect more customers).
- Shift from mainly being in summer to being in winter.
- Be spread throughout the day rather than just appearing during the evening demand peak.[38]

High renewables systems without sufficient dispatchable capacity are most susceptible to 'dunkelflaute' or 'dark doldrum' events, which are extended cloudy and still periods that sometimes occur during winter. At these times, demand is high owing to demand for heating, but solar and wind resources are low, owing to cloud cover and shorter days.[39]

The current approach may not be the best to manage changing risks

The NEM manages reliability risk via the Reliability Standard, which is a system-wide average for the number of minutes of power outages across a year (see Box 2).

Ideally, the Reliability Standard should reflect consumers' reliability preferences, so that it signals the right level and types of new generation and storage investment to meet those preferences, while balancing against consumers' willingness to pay.

However, the current Reliability Standard makes assumptions about *how* consumers value reliability.[40] It assumes, for example:

- Consumers do not value reliability very differently depending on the length of the outage, or by location, time of day, time of week, or season.
- Consumers are risk neutral rather than risk averse. That is, they don't value insurance against uncertain events, and only express concern about the average expected level of reliability.

Whether these assumptions are reasonable should be tested by the Australian Energy Market Commission (AEMC) and the Australian Energy Regulator (AER) because there is some initial evidence to the contrary.[41]

As our reliance on electricity increases (through rising use of electric vehicles and greater electrification in homes and industry), the importance of understanding and quantifying the consumer value of reliability only increases.

If the Reliability Standard and the market's responses to potential breaches of the standard do not reflect the value consumers put on reliability, it becomes less likely to lead to the right level and kinds of investment in energy supply infrastructure. This creates a political problem. Energy ministers are acutely sensitive to real or potential supply interruptions. If they do not see new generation and storage coming online to meet their level of risk aversion, they are more likely to intervene in the market in an ad-hoc way.[42]

2.4 The NEM was not designed for rapid change

The NEM was created at a time when the electricity system operated in steady state. The technology mix (coal, some gas, and a couple of large hydro facilities) was known with near-certainty. Demand growth was predictable and stable, being largely a function of GDP growth.

38. Reliability Panel (2023c). Modelling undertaken for the Reliability Panel *does not* predict that a high-renewables power system will face *more* issues with resource adequacy.
39. Wood and Ha (2021, pp. 26–27).
40. Reliability Panel (2023d, pp. 16–17).
41. Reliability Panel (2023c, pp. 13–14).
42. An example of this was the Morrison Government's decision to build a new gas-fired power station in response to the closure of the Liddell coal-fired power station in NSW, even though studies showed that no resource adequacy problem was likely to result from that closure. See Coorey (2020) and Frontier Economics (2019).

Price reductions would be gained by operating existing assets more efficiently. Operational and investment risks didn't vary much, and were well-understood.[43]

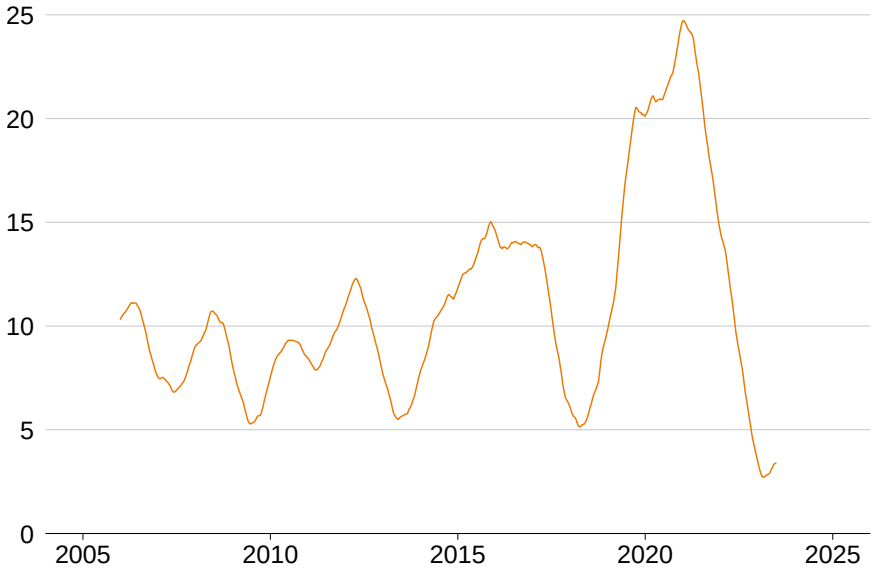
Leaving the system to technical specialists to run under these conditions was a win-win-win situation: consumers got lower prices, governments rid themselves of having to operate services, and ministers had convenient scapegoats in the very unlikely event that anything went wrong. Leaving the day-to-day running to the market bodies also papered over a key weakness in the governance structure: every state has the right to exempt itself from any of the NEM rules.[44]

The energy transition has turned all this on its head. The technology mix is changing rapidly. Demand growth has been absent for a long time, but may be abrupt in the future if electrification takes off. Price reductions no longer result from improving operational efficiency, they come from technology switching (which has its own associated costs in the new transmission required). The nature of operational risk has changed (Section 2.3), as has investment risk.

The current NEM governance system is designed for incrementalism. Market operations are based on rules, and there is a defined process for changing these rules if there is an opportunity to improve operational efficiency. But running a rules-based system in a time of rapid change means more rule changes, more often. And there are limits to the effectiveness of rule-changes when the market fundamentals themselves are under strain.

Figure 2.4: The number of rule changes has increased dramatically since the early 2000s

Number of active rule change processes, six-month rolling average



Notes: Gas market and retail rule changes excluded. Rule changes with staged implementation dates are treated as separate rule changes, one for each implementation date.

Source: Grattan analysis of AEMC (2024b).

43. Ben-David (2023).
44. Referred to as 'derogation'. At the time of writing, 29 jurisdictional derogations were in place: seven for Victoria, six for Queensland, five for NSW and South Australia, four for Tasmania, and two for the ACT: *National Electricity Rules* Chapter 9.

2.4.1 Governance and processes were designed for steady-state operation

The early 2000s were characterised by a stable two-to-three-year cycle of rule changes, where peaks were driven by the timing of regular reviews (such as those by the Reliability Panel) – see Figure 2.4. After 2010, this cycle was still in place, but more and more rule changes were underway at any one time, as the pace of change accelerated.

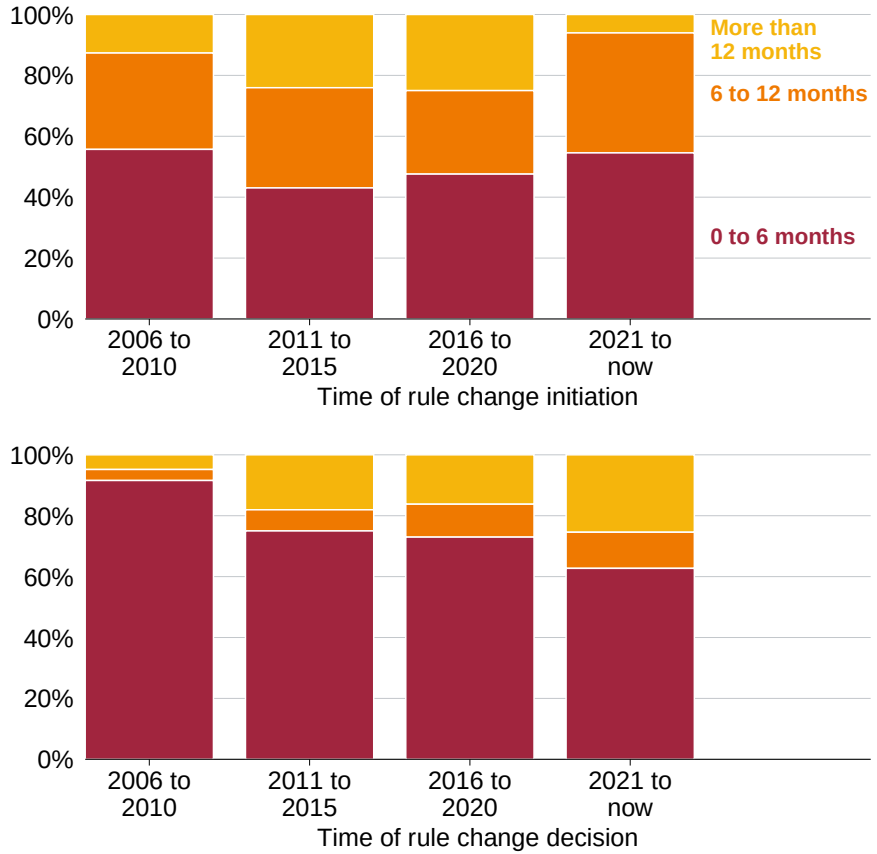
The time taken to institute and change a rule has not changed materially over time (Figure 2.5, upper chart) – to the AEMC's credit. More than 90 per cent of rule changes are decided within a year of being initiated. But it is becoming more common for implementation to be delayed (Figure 2.5, lower chart). This could be for several reasons: a natural consequence of trying to implement a large number of changes at once; market incumbents putting pressure on decision makers to delay implementation; or ministers are delaying rule changes they think may be unpopular.

2.4.2 Ministers are no longer content to rely on a rules-based system

The rule-change process has always been dominated by those who govern the market (Figure 2.6). But two striking changes are apparent that tell us something about how much ministers trust the market reform process.

Until 2012, market rule changes were mostly instituted by the market bodies, reflecting the 'leave it to the experts' nature of steady-state governance. From 2013 to 2016 there was a sharp jump in the number of government-initiated rule changes. Leaving things to the experts seemed to be out of favour.[45]

Figure 2.5: Rule changes are taking longer to come into effect
Share of rule changes progressing from initiation to decision (above) and decision to implementation (below), by time



Notes: Gas market and retail rule changes excluded. Rule changes with staged implementation dates are treated as separate rule changes, one for each implementation date.

Source: Grattan analysis of AEMC (2024b).

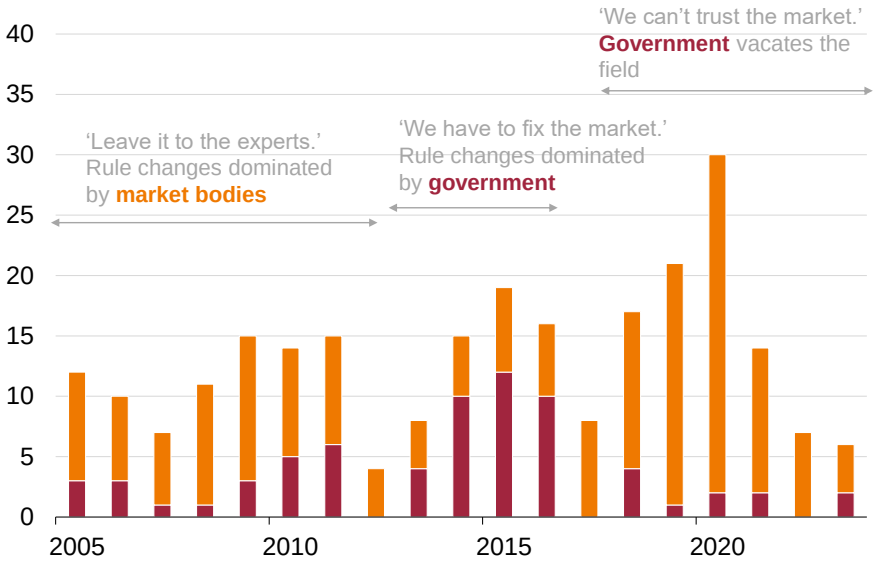
45. This is not shown in Figure 2.6, but it is also striking how seldom rule change proposals come from the electricity industry or from consumer representatives. Some of this pattern may reflect that developing a rule change proposal could be

Another abrupt change took place from 2017. Governments seemed to lose interest completely in instituting rule changes, the market bodies took over, and many more rule changes were instituted.

This period coincided with governments moving to more out-of-market interventions, such as bypassing the AEMC with the Interim Reliability Measure, committing to Snowy 2.0 without a prior feasibility study, attempting to underwrite new gas generation, establishing Renewable Energy Zones, and funding big batteries. None of these interventions has led to a material improvement in resource adequacy – but they have created more uncertainty for investors.

Figure 2.6: Governments' trust in markets and rules has declined over time

Number of rule changes proposed, by year



Notes: Gas market and retail rule changes excluded. Rule changes with staged implementation dates are treated as separate rule changes, one for each implementation date. Rule changes proposed by retailers, gentailers, generators, NGOs, consumer groups, and other stakeholders not shown.

Source: Grattan analysis of AEMC (2024b).

complex and time-consuming, with no guarantee of success. Market participants and consumers perhaps find it more effective to lobby ministers and market bodies for changes, rather than develop them themselves.

3 The current policy mix isn't fixing the problem

There have been multiple attempts over the past decade to address concerns about resource adequacy. Some have not succeeded and the more recent attempts have yet to be tested.

Coordinating coal exits with renewable and transmission build is only half complete. Coordination of renewables and transmission within states is partially addressed, but matching this with coal exits is still haphazard. And there is more focus on pushing extra renewable generation in than on an orderly exit for coal and a clear role for gas.

Attempts to address the changing nature of risks to reliability have involved piling policies on top of each other.

Fundamental market reform, to improve resource adequacy, manage coal retirements, build more transmission and improve access to it, and integrate consumer energy resources and flexible demand, has eluded a generation of federal and state ministers. Yet, this position can, and should, be turned around.

3.1 Coordination is only half-done

There are two areas of policy where better coordination is needed: coordinating coal exit with new generation entrance; and coordinating transmission build with renewable energy build.

3.1.1 Coal exit coordination

Specific renewable energy targets have been implemented at a federal and state level since 2000. They have successfully increased renewables' share of generation in the NEM from 8.5 per cent in 2008, to 34.6 per cent in 2022.[46]

These renewable energy programs have put financial pressure on existing coal and gas generators. The absence of a corresponding policy to maintain reliability as the mix changed has led to concern that closure of coal generators will create a reliability problem.[47]

Several mechanisms have been proposed to address this problem. To begin with, in 2018, a rule was introduced requiring coal generators to provide a minimum of three years' notice of their intended closure date.[48] This removed some of the uncertainty around exit and should have allowed sufficient time for replacement capacity to be built and reliability problems to be avoided.

On top of this, where there are fears that reliability risks could still eventuate, some state governments are negotiating contracts to ensure that coal closures are orderly. The Victorian government has signed confidential contracts with two existing coal generators.[49] The NSW government is negotiating a similar arrangement with Origin Energy to cover the Eraring coal plant in NSW.[50] It is impossible to assess how effective these will be in the absence of public detail about the terms.

3.1.2 Coordinating investment in renewable generation and supporting transmission

Early policies to support renewable energy took advantage of available capacity in the existing transmission grid. This capacity has been largely exhausted, so solar and wind farms now require additional infrastructure.

46. Saddler (2023).

47. AEMO (2023b).
48. AEMC (2018). This has since been increased to three-and-a-half years.
49. Macdonald-Smith (2021) and Gordon and Johanson (2023).
50. Macdonald-Smith and Hutchinson (2024).

In 2016, the Finkel Review of energy security recommended the establishment of Renewable Energy Zones (REZs) to minimise transmission connection costs.[51] This idea has been adopted by the NSW, Victorian, and Queensland governments.

Another attempt to reform generators' access rights to transmission is being progressed by the Australian Energy Market Commission (AEMC) through a recently initiated review.[52] It will seek to build on the Energy Security Board's earlier work to reduce risk to investors and enable transmission and generation coordination to provide a lower-cost power system for consumers. This review will report to the Energy and Climate Change Ministerial Council by September 2024.[53]

In the meantime, the NSW, Victorian, and Queensland governments have sought to get more control over coordination by establishing state-owned corporations to do all or part of the job. This may be a good role for government in the absence of more comprehensive transmission access reform, because the market cannot coordinate itself effectively without the appropriate price signals. But it is too early to judge whether these initiatives will succeed.

In NSW, EnergyCo oversees strategic planning for each Renewable Energy Zone (REZ), and coordinates tenders for building and accessing transmission.[54] The idea is that centralising planning and coordination could enable transmission and generation to be built quickly, cheaply, and in an orderly manner.

The Queensland government established CleanCo to integrate renewables while preserving reliability by building and operating new renewable generation.[55] This only partially coordinates new generation build with coal exit and transmission. It is unclear whether a government body can do this better than the private sector.

Similarly, the once-defunct Victorian State Electricity Commission has been reconstituted 'as an active energy market participant to build new renewable energy projects ... [and] ... keep the lights on'.[56] It has no role in transmission, and can no more coordinate with (private sector) coal exit decisions than any other market participant.[57]

Coordination between states is sorely lacking

Beyond the REZs, effective inter-regional transmission is a necessary component of a net-zero NEM.[58] But poor management of route planning, cost increases, and financing agreements continue to plague these projects.

The state REZs do not coordinate with each other to deliver overall lowest costs for consumers. It may be that it is cheaper for NSW consumers to import renewable electricity from Queensland or vice versa; or for Victoria to import from South Australia rather than build offshore wind. But there is nothing in REZ design to capture these benefits. And derogation[59] means that any such coordination cannot be relied on.

51. Finkel et al (2017).
52. AEMC (2024c).
53. Ibid.
54. EnergyCo (2024).
55. CleanCo (2024).
56. Andrews (2022).
57. Adherence to competitive neutrality policies also make it difficult for the SEC and CleanCo to achieve lower capital costs for new assets than the private sector could.
58. Wood and Ha (2021).
59. See footnote 44 on page 21 for an explanation of derogation.

3.2 Improvements to support for renewables have been made, but potentially not enough

The way governments currently encourage renewables is preventing the NEM from achieving resource adequacy at lowest cost (Section 2.2).

A range of government policies have contributed. They include state-based renewable energy targets, associated financial incentives, and the federal Renewable Energy Target (RET).

The RET has been pivotal in driving the uptake of renewables in the NEM. It will cease to support renewable generators after 2030, and reached its target of 33 terawatt hours of renewable electricity in 2020.

During 2023, the federal government became concerned that its target of 82 per cent renewables by 2030 would not be met.[60] It had already been working on a Capacity Investment Scheme (CIS) to directly finance 6 gigawatts of dispatchable, zero-emissions electricity during the transition. It decided to re-purpose and expand the CIS to underwrite investment in a total of 32 gigawatts of bulk renewables and storage by 2030.[61]

The central design element of the CIS will be contracts between the government and investors, awarded via competitive tender. The contracts will underwrite project revenues between a floor and a ceiling, removing some of the project risk, while also leaving some revenue risk to be managed by the project proponent.

As with the Large-scale RET, the CIS will provide revenue to generators outside the wholesale spot markets and encourage investment in renewables, like a second-best carbon price. While the intention is for the CIS to not affect bidding behaviour, it is unclear what the effect will be because detailed design of the scheme is still being finalised.[62]

One difference from the Large-scale RET, however, is that clean dispatchable capacity such as battery storage is eligible for the CIS, with 9 gigawatts being set aside for it.[63]

The first tender has recently been opened.[64] Further tenders are planned through to 2027. The CIS, if implemented as proposed, will add both generation and storage capacity. How effective and efficient it will be, how it will affect the spot market, and what will replace it are unclear.

State-based schemes, such as NSW's Long-Term Energy Supply Agreements and Victoria's VRET scheme, are also intended to increase investment in renewables. They do this by underwriting the returns of renewables projects, and thereby decreasing the cost of capital for their proponents.

These schemes will deliver more renewables. But the absence of coordination between states is likely to mean higher costs than would otherwise be the case, and the absence of coordination with coal exits adds to concerns of inadequate resources.

Between the Large-scale RET and the CIS and state schemes, the majority of generation in the NEM in 2030 will be underwritten by subsidies, risking a return to the inefficient and costly circumstances that led governments to create the NEM in the first place.

60. The federal government's target is for 82 per cent grid-connected renewable electricity by 2030, nationally. This may mean a higher percentage of renewable electricity in the NEM.
61. The 32 gigawatts of new capacity is expected to comprise 23 gigawatts of renewables, and 9 gigawatts of clean dispatchable capacity (3 gigawatts in addition to the 6 gigawatts previously announced): DCCEEW (2024a).
62. Ibid.
63. Ibid.
64. Ibid.

A range of reforms are also underway to better integrate distributed energy resources (DER) for resource adequacy. These are largely regulatory reforms to better integrate DER, by making more provisions for greater two-way flows of electricity.

The recently announced taskforce to develop and implement a National Consumer Energy Resources Roadmap for effective integration of consumer energy resources (CER)[65] is valuable but not sufficient. The Roadmap will focus on CER, a subset of DER that doesn't include larger assets not owned by individual consumers. The Roadmap will also mostly seek to lay the groundwork for more CER uptake through the development and harmonisation of standards and consumer protections. It will not seek to open up the more fundamental questions around the roles, rights, and responsibilities of consumers, retailers, and distribution network service providers in DER.

3.3 The changing nature of reliability risks has not been fully addressed

Ensuring reliable supply has been a requirement of the NEM since its inception in 1998. Severe storms and vehicle accidents have caused most supply disruptions by bringing down network infrastructure (see Figure 1.5), but resource adequacy has not been a major concern for most of the NEM's history.

Concerns began to emerge over the past decade about the impact of greater renewable electricity generation that led ministers and market agencies to introduce three new policies and mechanisms, on top of the existing Reliability Standard and the Reliability and Emergency Reserve Trader (RERT) mechanism.[66]

The result is a muddy mix of measures, which have not been well integrated, and some have not yet been tested. And yet, the underlying and longer-term issue of addressing the changing nature of reliability risks in a renewables-dominated system (Section 2.3) has not been completely addressed.

The Reliability Standard

The Reliability Panel is reviewing the form of the Reliability Standard from 2028 to ensure it responds to the changing nature of resource adequacy risks in a high-renewables NEM. As explained in Section 2.3 on page 20, a standard that accurately reflects consumer reliability preferences will better allow the market to provide adequate resources as the economy becomes more reliant on electricity in the future.

In its draft report, the Panel has concluded that the current form of the Reliability Standard will still sufficiently capture resource adequacy risks in a future high-renewables NEM.[67] Its modelling finds that some significant but very rare electricity shortages may occur in the future, and that these events won't be captured well by the current Reliability Standard. But, given the rarity of those events, the Reliability Panel argues that it is not the role of the Reliability Standard to deal with those events.[68]

The draft report recommends that the Reliability Standard can be improved to include a more accurate consideration of consumer preferences based on already available information.[69] In particular, the draft report proposes to change the calculation of the Reliability Standard to be based on the characteristics of resource adequacy events only, whereas the calculation currently takes into account power outages of all causes.[70] This would more accurately incorporate consumer preferences for reliability. While consumers do not

65. Energy and Climate Change Ministerial Council (2024a).
66. Operations of the Reliability Standard and the RERT are outlined in Box 2.
67. Reliability Panel (2024).
68. Ibid (pp. 12–13).
69. Ibid (pp. 17–18).
70. Ibid (pp. 17–18).

distinguish between power outages by their cause, outages due to resource inadequacy tend to differ from those due to other causes by length, and prevalence by time of day, time of week, and season.[71]

This is a good first step, but ensuring the Reliability Standard best captures the changing nature of reliability risks is an ongoing job.

The Retailer Reliability Obligation

The 2016 statewide blackout in South Australia triggered what became a succession of attempts to deal with concerns about the security and reliability of the NEM. The Finkel Review recommended a wide range of actions, including the introduction of a Clean Energy Target as a sector-based emissions reduction policy.[72]

After dumping the Clean Energy Target, the Turnbull government was still worried about managing the reliability and price impacts of addressing climate change. Its proposed solution was the National Energy Guarantee (NEG).

The NEG was a genuine attempt to integrate energy and climate policy. The central concept was to impose two obligations on energy retailers: an obligation to supply sufficient quantities of 'reliable' power to the market (the Retailer Reliability Obligation); and an obligation to reduce emissions over the decade between 2020 and 2030.[73]

The emissions reduction obligation was ultimately abandoned (as was Turnbull as Prime Minister) and the Retailer Reliability Obligation was implemented alone in 2019. Based on a forecast breach of the Reliability Standard, AEMO can trigger the Retailer Reliability Obligation. When the trigger is pulled, retailers and some large electricity users must demonstrate they have obtained contracts that cover their share of a one-in-two-year peak demand in the relevant gap period.

This mechanism has yet to be fully tested,[74] and is viewed negatively by parts of the industry.[75] Concerns about its costs and regulatory burden led to an operational review by the Australian Energy Market Commission that was finalised in February 2024.[76]

The Interim Reliability Measure

In late 2019, federal and state ministers, concerned that existing reliability mechanisms might not be effective enough to meet community expectations of reliability, sought additional advice from the Energy Security Board.[77] The accepted advice was for an Interim Reliability Measure set at 99.9994 per cent of expected demand being met – equivalent on average to 3 minutes of resource adequacy-related power outages across the entire NEM in a year. This is three times more stringent that the Reliability Standard of 10 minutes and 30 seconds.

It is now the Interim Reliability Measure that acts as a trigger for the Retailer Reliability Obligation and for an Interim Reliability Reserve, which is an additional 'out of market' capacity reserve that AEMO may choose to contract.[78]

71. Ibid (pp. 17–18).
72. Finkel et al (2017).
73. Murphy (2018).
74. The Retailer Reliability Obligation (RRO) has been triggered without being revoked only once so far, for the January to February 2024 period in South Australia. No one-in-two-year peak demand events occurred during this period, so the effectiveness of the RRO was not tested: AER (2024).
75. Australian Energy Council (2023).
76. AEMC (2024d).
77. The Energy Security Board was established following the Finkel Review (Finkel et al (2017)), and comprised the heads of the three market institutions, with an independent chair. Initially, the Board's main role was to implement the recommendations of the review. The Board was abolished in May 2023 and replaced with an advisory panel comprising the market institutions only.
78. ESB (2020).

In September 2023, the Australian Energy Market Commission made a rule to extend the use of the Interim Reliability Measure until June 2028, pending a review of the form of the Reliability Standard.[79]

The tighter Interim Reliability Measure, however, could be increasing costs to consumers and uncertainty for investors. Consumers may be paying for more reliability than they actually want, and investors are unsure whether investments should be targeted towards the Interim Reliability Measure or Reliability Standard level of reliability.[80]

Further, an unintended consequence of the Interim Reliability Measure has been to make the NEM look less reliable rather than more (see Figure 3.1). Media coverage tends to focus on the more stringent standard of the Interim Reliability Measure, rather than the Reliability Standard which is often not at risk of being breached in the short term.[81]

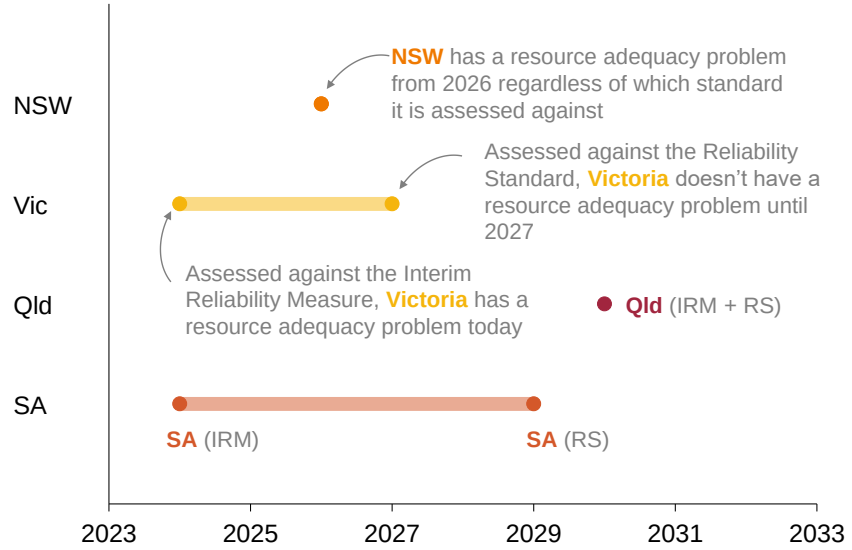
Attempts to value capacity

In March 2019, the federal and state energy ministers asked the Energy Security Board to review the NEM, in terms of what the energy market should look like beyond 2025.[82] One objective was 'to deliver reforms that ensure sufficient dispatchable resources and storage capacity are in place before anticipated plant closures, and before generator exits cause significant price or reliability shocks to consumers'.[83]

The Energy Security Board identified a critical need 'to develop a capacity mechanism to ensure reliable supply is maintained as the

Figure 3.1: Having two reliability standards makes the NEM look less reliable

Financial year the Interim Reliability Measure (IRM) or Reliability Standard (RS) is forecast to be breached, by state



Notes: States shown with one dot breach both standards in the same year. Tasmania is not shown because it does not have a forecast breach of the IRM or the RS in the timeframe shown.

Source: Grattan analysis of AEMO (2023b).

79. AEMC (2023).
80. See the dissenting submissions to AEMC (ibid).
81. Media reporting on the 2023 ESOO focused on reliability problems in Victoria and South Australia during 2024, which is when the Interim Reliability Measure but not the Reliability Standard was forecast to be breached. For example, see: Lowrey (2023) and Hannam (2023).
82. ESB (2024a).
83. ESB (2024b).

share of renewables grows rapidly. The mechanism's intention is to create a clear, long-term signal for investment, in both existing and new dispatchable capacity (such as coal, gas, batteries, and hydro)'.[84]

A high-level design paper for such a capacity mechanism was delivered to ministers in June 2022.[85] The mechanism was strongly criticised by ministers, who rejected any inclusion of gas, and by renewable energy advocates, who saw it as a threat. It was abandoned by the ministers.

The task of designing a capacity mechanism was assigned to the federal Department of Climate Change, Energy, the Environment, and Water in the form of a Capacity Investment Scheme (CIS). Before that task was completed, the federal government decided to co-opt the mechanism to be the central policy instrument to achieve its target of 82 per cent renewables by 2030. Considerable detail of how the expanded CIS will function is yet to be determined, and consultation with industry is proceeding.

3.4 Attempts at major market reforms have failed

The NEM was established at what now looks like a time of considerable stability. Major reforms were largely unnecessary, and market institutions were able to carry out their functions with reasonable autonomy. This began to change as the implications of climate change and relevant legislation became clearer, particularly as growth of renewable generation accelerated.

As described above, the 2016 blackout in South Australia triggered a succession of policies and mechanisms, alongside the creation and operation of the Energy Security Board. Despite these efforts, energy ministers remained concerned about security of supply. As described in Section 3.3, rather than seek advice from the Australian Energy Market Commission, they asked the Energy Security Board for advice on a long-term, fit-for-purpose market framework to support reliability that could apply from 2025.

The Board focused on four key areas: resource adequacy mechanisms and ageing thermal retirement; transmission and access; essential technical services to support the security and stability of the grid; and integration of consumer energy resources and flexible demand.[86]

A new secretariat and multiple working groups were set up to develop recommendations that the Board could take to the Energy Ministers Council. During the ensuing couple of years, it became clear that too much was being attempted in too short a time.

Almost every policy option was opposed by vested interest groups and some by ministers.[87] Many industry participants simply lost interest. Federal and state energy departments may have felt the Energy Security Board was usurping their role in providing policy advice to ministers.

Despite the recognised urgent need for major market reform, and best efforts of the Energy Security Board and its extended industry consultation, no such reforms were achieved and the Board was abolished in May 2023.

This sorry history of failure to identify and implement major market reforms would seem to have been due to a combination of a loss of ministerial confidence in both the Australian Energy Market Commission and the Energy Security Board – the body established by the same ministerial council but poisoned by vested interest in the status quo, or specific, narrow initiatives.

The result is that responsibility for reform is unclear.

84. Ibid.
85. ESB (2024a).
86. Ibid.
87. Macdonald-Smith and Durkin (2022).

The federal government has committed to working with state governments to develop post-2030 market reforms for consideration and decision by the end of 2025.[88] This leadership is welcome, but the scope of the task is unknown, and it is unclear how this exercise will avoid the pitfalls that undid the Energy Security Board.

88. Energy and Climate Change Ministerial Council (2023a) and Energy and Climate Change Ministerial Council (2024a).

4 What governments should do

Two distinct eras lie ahead for the NEM: the era of coal closure, and the post-coal era. The issues faced in each of these periods are different, and require different approaches. Governments should treat them as two distinct, though linked, challenges.

The coal closure era will be characterised by lumpy withdrawals of capacity, a shift from centralised to decentralised generation, and the emergence of demand growth after years of stagnation. Governments will need to spend considerable political capital during this time to build sufficient generation capacity and transmission to replace exiting coal.

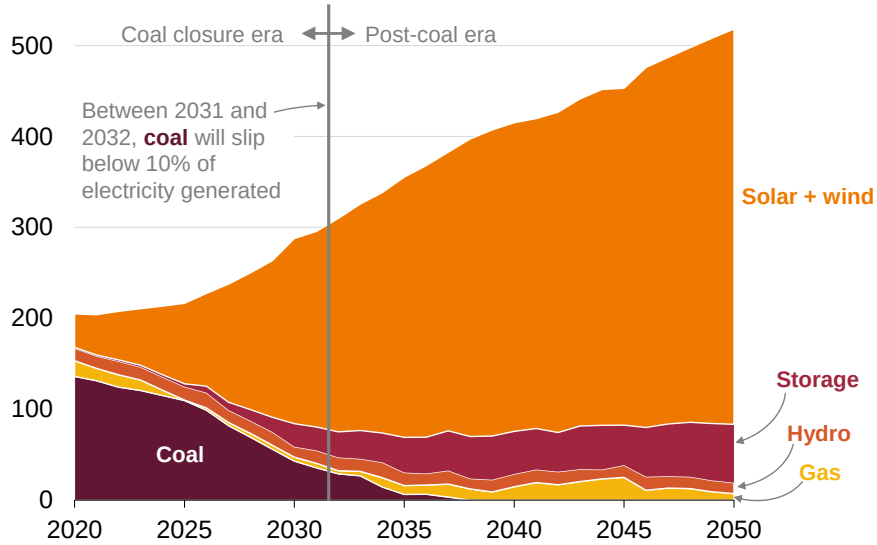
The current patchwork of policies, with some tweaks, is a partial solution. Given the time imperative, governments and industry should accept this as a period of muddling through, with as many band-aid fixes as are necessary, to keep the lights on and prices down.

The post-coal NEM will look very different: different generation and storage technologies will dominate, and they will often have different financing requirements, correlated risks, and be much more dispersed.

Issues that are foreseeable in the post-coal NEM should be planned for. These include coordinating the efficient integration of distributed energy resources, and providing an enduring future carbon signal to encourage more stable gas investment and exit. The future NEM does not need to be designed to facilitate coal exit, because by the time it is in place, coal will not be a material part of the market.

Finally, the new market needs a better governance structure to ensure the NEM is robust to future unknowns.

Figure 4.1: If current forecasts are right, the post-coal era begins in 2032
Terrawatt-hours of generation



Note: 'Storage' includes utility storage, and consumer storage. We've chosen 10 per cent of annual electricity supply as a materiality threshold for the coal closure era.

Source: AEMO (2023a), Step Change scenario.

4.1 There are two distinct eras, and governments need to manage them differently

The NEM is currently in the era of coal closure. This era started with the closure of the South Australian Northern plant in 2016 and the Victorian Hazelwood plant in 2017. The era will continue until coal no longer plays a material part in energy supply.

The coal closure era is characterised by:

- A major shift from large, centralised generation to smaller, decentralised generation, including distributed energy resources.
- Lumpy withdrawals of coal capacity, which risks leaving significant resource adequacy and affordability gaps, unless there is timely entry of replacement capacity.
- Federal and state government renewables and emissions-reduction targets for 2030, which will inform and constrain what governments are willing and able to do.
- A significant construction task, and investment of financial and political capital to get the energy transition on track.
- Emerging growth in electricity consumption as homes and businesses move from consuming fossil fuels to using electricity.

Many of the policies and mechanisms that will help steer the NEM through this era are either already in place or committed. But they require focus and coordination to be effective.

Once coal is no longer more than 10 per cent of annual electricity supply,[89] the NEM will be in its post-coal era. On current forecasts, this will be around 2032 (see Figure 4.1).

This NEM will look very different:

- Coal generation will be a small share of all generation, and gas will be used primarily to balance a high-renewables system.
- Storage will be a key part of the electricity mix.
- There will be strong growth in electricity consumption due to electrification of the gas and transport load, and for green hydrogen production.
- Higher levels of renewable generation will mean resource adequacy risks take on a different character to now.[90]
- Transmission will be of greater value to an integrated NEM in balancing supply with demand.
- Take-up of distributed energy resources (both generation and storage) will continue to grow strongly.

Market reform attempts to date have tried to deal with both these eras simultaneously. This is one reason they have been politically difficult. The circumstances and risks during coal-exit, and the balance of market interests, are very different to those that follow. Attempting to create one set of rules that manages both eras necessarily leaves everyone unsatisfied.

Markets, rules, and a hands-off approach are not well-suited to dealing with the risks of the coal closure era. Government interventions are probably unavoidable, and they may bring some unpleasant trade-offs. Realising this, other governments around the world have gone down the route of greater intervention.[91]

89. We've chosen 10 per cent of annual electricity supply as a materiality threshold for the coal closure era. The share of renewables in electricity generation on an instantaneous basis is the more important metric for system security purposes, and this metric will reach 90 per cent before it does for annual electricity supply. However, for resource adequacy, the coal closure era is better defined by the coal share of annual electricity supply.
90. Section 2.3 on page 19 explains this in more detail.
91. Ragosa et al (2024).

Governments will face fewer political constraints once coal is no longer a material part of the mix. Governments may still not want to let go of the option to intervene where they believe it is necessary. But unless they want to return to the days of complete government ownership, they will need to create new rules for a more hands-off post-coal era. This task will be easier – technically and politically – if governments assume that coal is no longer present.

4.2 Immediate actions to ensure resource adequacy through the coal closure era

Current policies and other market interventions reflect a mix of responses to real concerns such as increasing risks to resource adequacy, as well as to meet jurisdictional political objectives. Some interventions, such as contracts to reduce the risk of untimely coal closure, or direct funding such as the Capacity Investment Scheme, will be short-lived. In moving beyond these measures towards the post-coal era, we should retain what works well and discard what doesn't.

The focus right now should be keeping the lights on. Nobody should expect major market reforms. The objective should be to get through this difficult period where coal is closing and renewables are growing, while maintaining social licence for the energy transition. The risk from this approach is likely to be to cost.

This may seem like governments and industry are "muddling through" but this is best available path for this transition period, given where we are now.

Muddling through doesn't mean ignoring risk. There are predictable risks to be managed, including increasingly unreliable coal plants, transmission delays and cost over-runs, and supply chain issues.

4.2.1 Resource adequacy

As described in Chapter 3, resource adequacy is currently supported by the Reliability Standard,[92] the Interim Reliability Measure, the Reliability and Emergency Reserve Trader, and the Retailer Reliability Obligation (RRO). The timing of coal closures and the dispatchable capacity added by the Capacity Investment Scheme will also have an impact. This is a messy arrangement that may be effective, if not lowest cost, for now.

For example, the value of the RRO has been questioned by industry and some changes have been recommended by the AEMC and accepted by ministers. However, it has not been used to trigger specific actions to date.[93] Further changes in the short-term should be avoided in the context of planning for a broader reliability framework.

And while the form of the Reliability Standard is under review, the Reliability Panel's draft report recommends no change from 2028. The Panel notes that the Reliability Standard isn't the right tool to deal with all resource adequacy issues, and short-term reliability risks caused by 'non-market' factors are better dealt with using some of the government initiatives currently being considered or implemented, such as the above.[94]

92. Including the implementation of the Reliability Standard in the wholesale spot market through the Market Price Cap and the Cumulative Price Threshold.
93. The RRO has only been triggered without being revoked once so far, for the January to February 2024 period in South Australia. No one-in-two-year peak demand events occurred during this period, so the effectiveness of the RRO was not tested: AER (2024).
94. Reliability Panel (2024, p. iii).

4.2.2 Maintaining momentum on emissions reduction

The federal government's 2023 projections suggest that emissions from electricity generation will fall to 60 million tonnes per annum by 2030, assuming that the target of 82 per cent renewables is reached.[95]

Hitting, or getting close to, the 2030 target and creating momentum this decade for what comes next will be supported by the Large-scale RET, the Capacity Investment Scheme, state-based renewable policies and contracts, or other mechanisms to manage coal closure.

Pushing harder on 2030 renewable electricity targets may be ultimately counter-productive, because it will exacerbate existing problems. The momentum provided by the Large-scale RET, the CIS, and REZs is enough for now.

4.2.3 Managing coal exits for resource adequacy

Political interventions and increasingly frequent outages of ageing plants mean coal closure timing is uncertain. Investors need market predictability, and ministers need lower risk of blackouts. Mechanisms have been recommended to address these dual concerns but they have been rejected.[96]

Governments have shown a preference for direct intervention. The Victorian government has contracts with the owners of the Yallourn and Loy Yang A coal-fired power plants to provide some form of government underwriting of early closure risk.[97] The NSW government is reported to be doing something similar with the Eraring coal-fire power plant.[98] The NSW government has also proposed an optional orderly exit framework, although this has already been strongly rejected by the industry as only increasing market uncertainty for investors.[99]

Some form of closure insurance seems likely and it might be a pragmatic, if blunt, solution. Whatever the model, it should avoid shifting excessive risk from operators to governments, and its operation should be transparent to the market. It should also avoid creating perverse incentives for coal-fired power station owners to bring their closure dates forward in order to get subsidies.

4.2.4 System planning

Building new transmission to support the energy transition is not going well. Issues such as cost overruns, cost sharing arrangements, and securing social licence from regional communities are big challenges. These issues are less policy-related than others and beyond the scope of this report.

Planning and regulatory approvals are essential to timely building of transmission infrastructure through and beyond the coal closure period. They are too complex and too slow.

Governments should collectively identify immediate and practical actions to address the bottlenecks and barriers. Some actions are simply good social policy, although poorly-implemented past attempts to achieve social licence have created their own barrier.[100] Others, such as route planning flexibility and compulsory acquisition of easements, are not simple and will need much-improved communication and very focused management.

95. DCCEEW (2023).
96. For example, a coal power reserve scheme has been proposed: Macdonald-Smith (2024), as has an escrow fund: Wood et al (2019b).
97. Macdonald-Smith (2021) and Gordon and Johanson (2023).
98. Macdonald-Smith and Hutchinson (2024).
99. See dissenting submissions to the Energy and Climate Change Ministerial Council (2023b).
100. Dyer (2023).

The Integrated System Plan (ISP) has evolved over several years since it emerged from the Finkel Review.[101] AEMO[102] and energy ministers[103] now describe the ISP as providing an outline of the lowest-cost mix of generation, transmission, and storage to reliably meet consumers' energy needs and Australia's emissions targets. It takes into account federal, state, and territory policy frameworks but does not assess the practicalities of such policies.

The ISP could be a far more valuable part of planning the NEM. Following a recent review, the 2026 ISP will now include a deeper consideration of the role of gas, and will consider community acceptance when assessing transmission options.[104] The plan should include a wider range of significant, potential future risks in its scenario assessments, including those that will arise from climate change. Finally, the plan should be supported by the Ministerial Council with appropriate policies and rules for its implementation.

4.2.5 Coordination and governance during the coal exit era

There is no time to change the governance of the energy market and the coordination structures to deal with coal exits. Governments and industry will need to work with what is there as best they can.

4.2.6 Managing what could go wrong

Risks that could create serious new problems during the coal closure era should be identified for planning and insurance purposes:

- Ageing coal plants are failing more frequently, and this will only get worse. Multiple concurrent coal unit failures are a significant risk, as was highlighted during the energy supply crisis in mid-2022 that resulted in AEMO suspending the market to gain a degree of direct control.
- Unexpected issues could arise in the operation of the mix of current reliability mechanisms, including the Retailer Reliability Obligation and the Capacity Investment Scheme that haven't been tested to date.
- Affordability and resource adequacy challenges are likely to arise as solar and wind move towards constituting 90 per cent or more of generation.[105] AEMO's Electricity Statement of Opportunities should provide early warning of these challenges.
- Each year brings more evidence of the near and present dangers of climate change. Policies that deliver faster emissions reductions across the economy should be an urgent priority for the federal government and the Climate Change Authority.
- One of the hazards of a patchwork policy landscape is the increased risk of unexpected or unintended interactions between policies, that have adverse effects.

4.3 Plan now for the post-coal era

Governments need to start planning now for market reforms for the post-coal era.

If the recommendations above lead to a successful transition through the coal closure era, the value of coordinating policies and planning across jurisdictions should have become clearer. The value to all NEM states of the interconnected NEM should also be clearer. It then becomes at least possible, and surely desirable, for the ministers of each sovereign government in Australia to contribute to a rekindled Australian Energy Market Agreement.

101. Finkel et al (2017).
102. AEMO (2023a).
103. Energy and Climate Change Ministerial Council (2024b).
104. Energy and Climate Change Ministerial Council (2024c).
105. Wood and Ha (2021).

In 2017, the Finkel Review recommended that Australia's energy ministers agree to a new Australian Energy Market Agreement that commits all parties to take a nationally consistent approach to energy policy.[106] This recommendation was not adopted at that time. In planning for the post-coal era, implementing such an agreement would be an ideal role for the National Energy Transformation Partnership struck by the federal, state, and territory ministers in 2022.[107]

The process of developing a new Agreement should be led by governments, because it goes to matters of policy (and politics). The current NEM review being done by the federal department should form the basis of a fundamental review of the operation of the NEM. The states need to be brought into the design process, because they will be integral to the success of the new NEM.

If the review is to develop an enduring framework for the NEM, it must avoid the pitfalls that previous attempts encountered. The review must be approached as a co-design exercise with consumers, industry, and politicians, drawing on the deep expertise of the market bodies.[108] It has to acknowledge and accommodate political and physical realities as well as technocratic theory.

This design work should begin with a cross-jurisdictional review to identify the respective roles for markets, consumers, and governments; and decide what rights and responsibilities each of these groups should have.

The technical detail of designing rules and operating procedures that reflect these rights and responsibilities can then be passed to the market bodies to develop.

106. Finkel et al (2017).
107. Energy and Climate Change Ministerial Council (2022).
108. The market bodies should not lead the process, because part of the process may include reviewing their roles.

A new Agreement should include four priorities focused on resource adequacy.

4.3.1 A comprehensive reliability framework

In the post-coal era, significant lapses in reliability due to lumpy exits of coal are less of an issue, and an opportunity presents to rationalise the NEM's reliability framework. The current mix of tools to maintain resource adequacy described in Section 4.2.1 should be reviewed to ensure they remain fit for purpose.

At this point, the nature of resource adequacy risk will be different, and may require different tools to manage. Managing the cost to consumers of maintaining resource adequacy should be a greater priority than in the coal closure era. The Reliability Standard will be one part of ensuring this happens.

While the Reliability Standard in its current form may serve the NEM well for now, it should continue to be tested to assess whether it remains fit for purpose in the future. This will require developing a better understanding of consumer preferences for reliability. Doing so is more important in the post-coal era, as reliability preferences will probably change due to increased reliance on electricity.[109]

The Reliability Standard will not be the solution to all resource adequacy risks. High-consequence, low-probability, hard-to-avoid, unpredictable risks may be better managed via an insurance approach. Users could be compensated when such risks manifest. Or, governments could self-insure against these risks by owning and operating assets that are only used during these events.[110] Capacity markets and other mechanisms should also be considered.

109. Reliability Panel (2024, p. 18).
110. This is an expensive form of insurance, as evidenced by the South Australian government leasing two diesel generators as 'insurance' after the 2016 statewide blackout. These were used for a total of only four hours, at a cost of $111 million.

4.3.2 An enduring carbon signal for the electricity sector

The Climate Change Authority will advise the government on a 2035 emissions reduction target and sector pathways towards that target.[111] As part of the government's economy-wide Net Zero Plan, the federal department is also developing a net zero plan for the electricity and energy sector.[112]

The closure of coal should clear the way for coordination and alignment of federal and state emissions reduction targets and policies, without diminishing the policy responsibilities of the jurisdictions.

The sector plan should include a clear and enduring forward carbon signal to guide energy sector investment decisions, especially gas plant entries and exits. This is important because gas can be a low-cost way of achieving resource adequacy in a net-zero electricity system.[113] The Climate Change Authority should advise on the form of this carbon signal, and whether it should be economy-wide or sector-specific, but it is the federal government's responsibility to adopt the policy and coordinate implementation with the states and territories.

One approach that would align electricity generation with other sectors would be to include the sector in the Safeguard Mechanism, with the generators as individual facilities. An alternative would be to impose a direct carbon obligation levy that could be acquitted via offsets such as Australian Carbon Credit Units.

The sooner this is done, the more certainty there will be for gas generators, and the more certainty market operators and governments will have about the role of gas in maintaining resource adequacy.

111. Climate Change Authority (2023).
112. DCCEEW (2024b).
113. Wood and Ha (2021).

4.3.3 Coordinating distributed energy resources

Greater coordination of distributed energy resources (DER) will contribute to resource adequacy and affordability.

The Energy Security Board failed to make tangible progress on this. That policy work should restart as soon as possible, because better coordination would allow for capturing more DER assets in the new regime and grandfathering fewer assets in the old regime.

The National Consumer Energy Resources Roadmap (the Roadmap), which is currently being developed, appears to be a necessary but insufficient approach to address the broader issues of DER integration.[114]

While the Roadmap will help get consumer energy resources (CER) integration on track during the coal closure era, the Energy and Climate Change Ministerial Council should ensure a more substantial framework is in place for the post-coal era. This framework should consider all DER, including larger assets not owned by individual consumers, and seek to answer the more fundamental questions around the roles, rights, and responsibilities of consumers, retailers, and distribution network service providers in DER.

4.3.4 Better market governance

The governance structure of the NEM should be redesigned to ensure the system can meet the resource adequacy needs of the future.

Governments should not assume a return to a hands-off approach until emerging risks in the future market are assessed, and consideration given to who's best placed to manage those risks.

114. Energy and Climate Change Ministerial Council (2024a).

The new governance structure should include representation for energy consumers, because ultimately, they are the reason for the NEM's existence.

It also needs to include better mechanisms for reviews. The Australian Energy Market Commission is well-positioned to conduct operational reviews once a post-coal market is in place, and it could review whether circumstances justify continuing with one policy or another. But it, and the other market bodies, are not the best bodies to do reviews that go to the fundamental underpinnings of the market, because they are part of that structure.

The new governance structure also needs a better way of dealing with the split between state and federal responsibilities, and with derogation.[115] While the States have clear decision-making powers under the federal system, this must be balanced against achieving an effective market that delivers for all consumers using it.

The first-best outcome will be a well-regulated, optimised market that meets the long-term needs of consumers. The analysis and recommendations in this report should provide ministers, consumers, and market participants with confidence that Australia can make the transition to the post-coal era and towards net zero while keeping the lights on and consumer bills affordable.

115. See footnote 44 on page 21 for an explanation of derogation.

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